

# Science to Sustain At-Risk Terminal Lakes

## Walker River Basin Project



In Cooperation with the Bureau of Reclamation  
NWRA Conference, Mesquite, NV, 2/21-23/2006

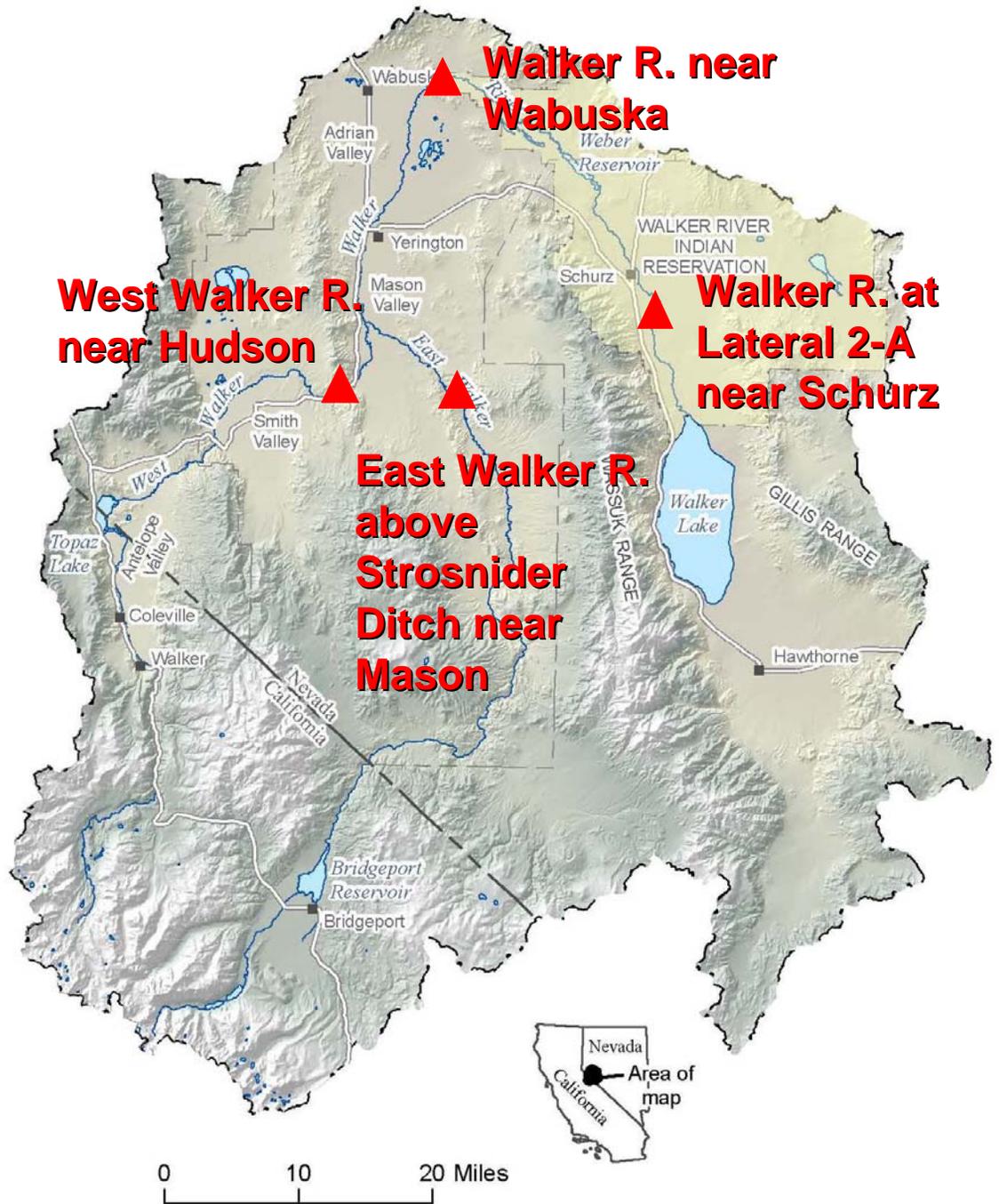
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Doug Hutchinson  
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Funded by the Bureau of Reclamation  
through the 2002 Farm Bill

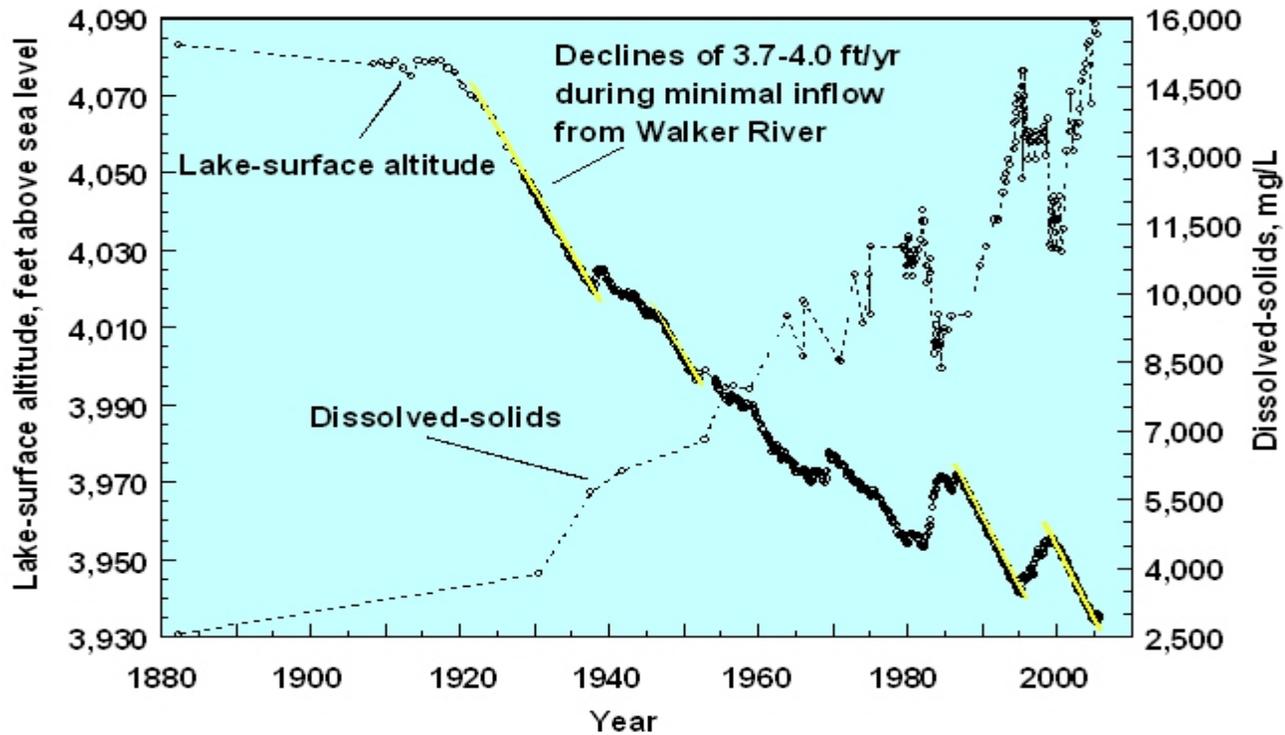
# Presentation Overview

- Problem
- Objectives
- Status of activities
- Plans for upcoming year

# Location of Walker River Basin

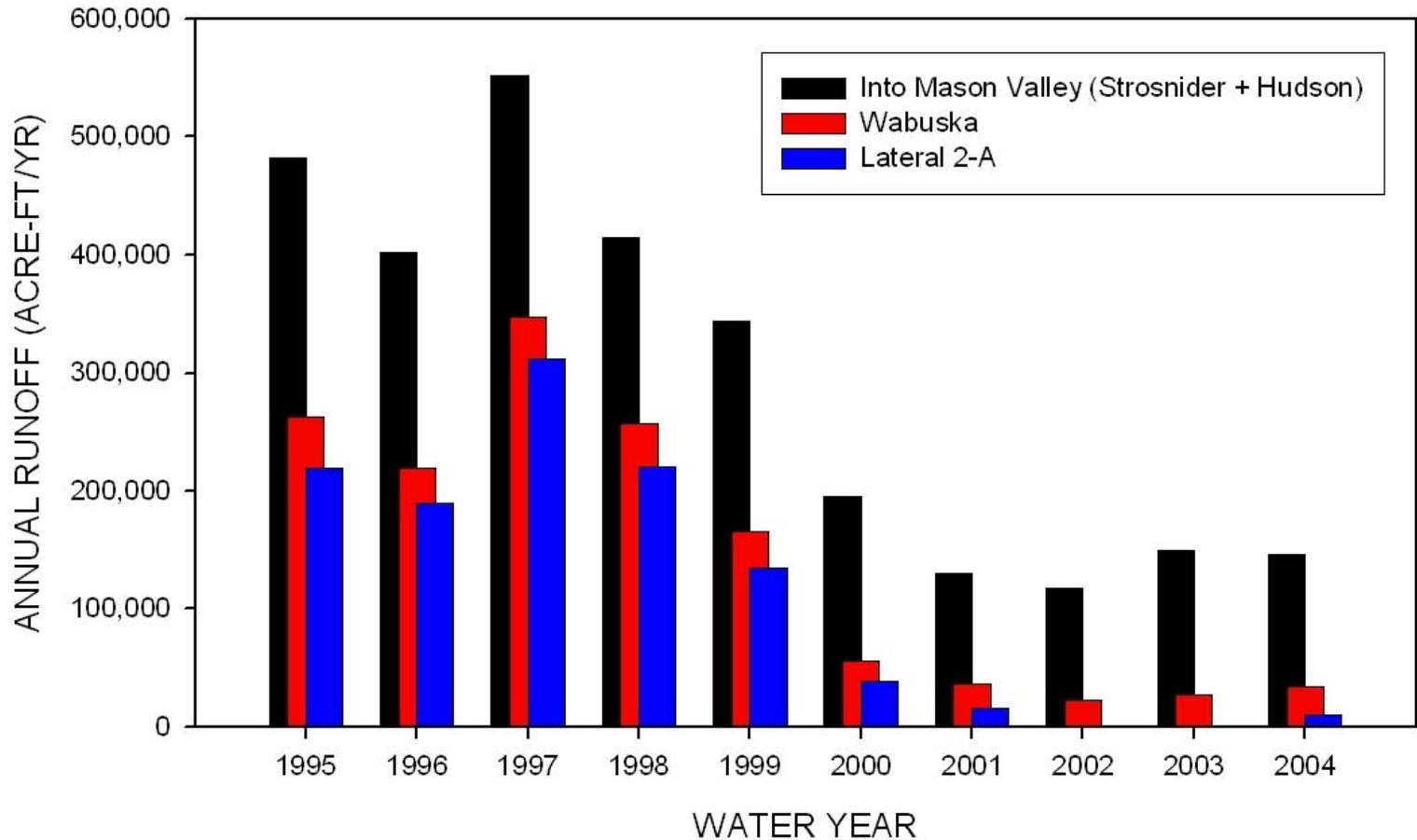


# Walker Lake Salinity



# Walker River Streamflow

Annual runoff for select locations along Walker River.



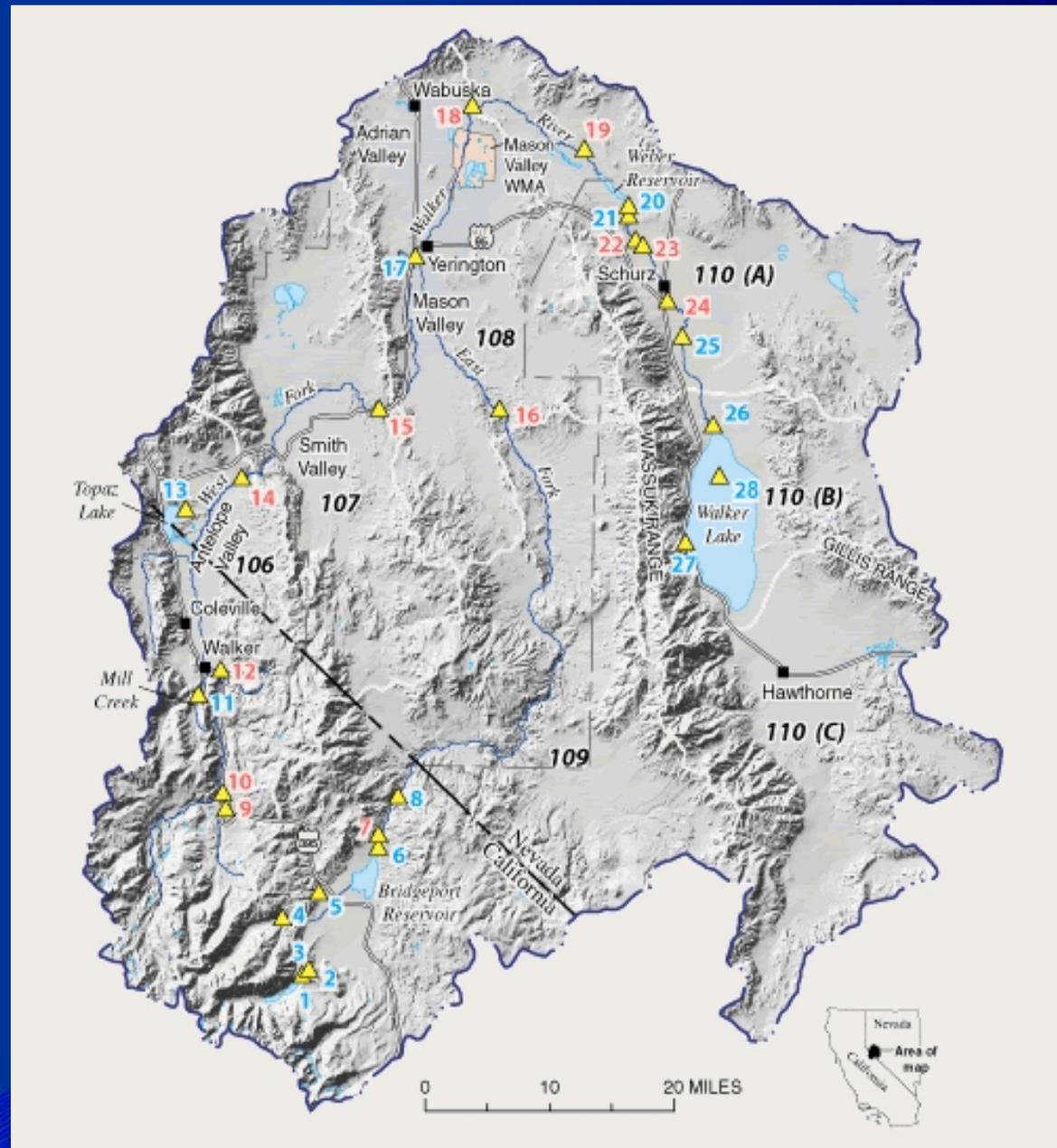
# Objectives

- Quantify streamflow in the Walker Basin
- Estimate evapotranspiration from the lake and vegetation
- Develop an improved water budget for Walker Lake
- Develop the capability to predict how changes in upstream irrigation practices would affect flows to Walker Lake

# Activities

- Surface-Water (SW) network
- Ground-Water (GW) network
- Evapotranspiration (ET) network
- Mapping vegetation, elevation, bathymetry
- Preliminary streamflow analysis
- Web Site

# SW Network –new and upgraded gages



# New Stream Gages

Green Ck near Bridgeport



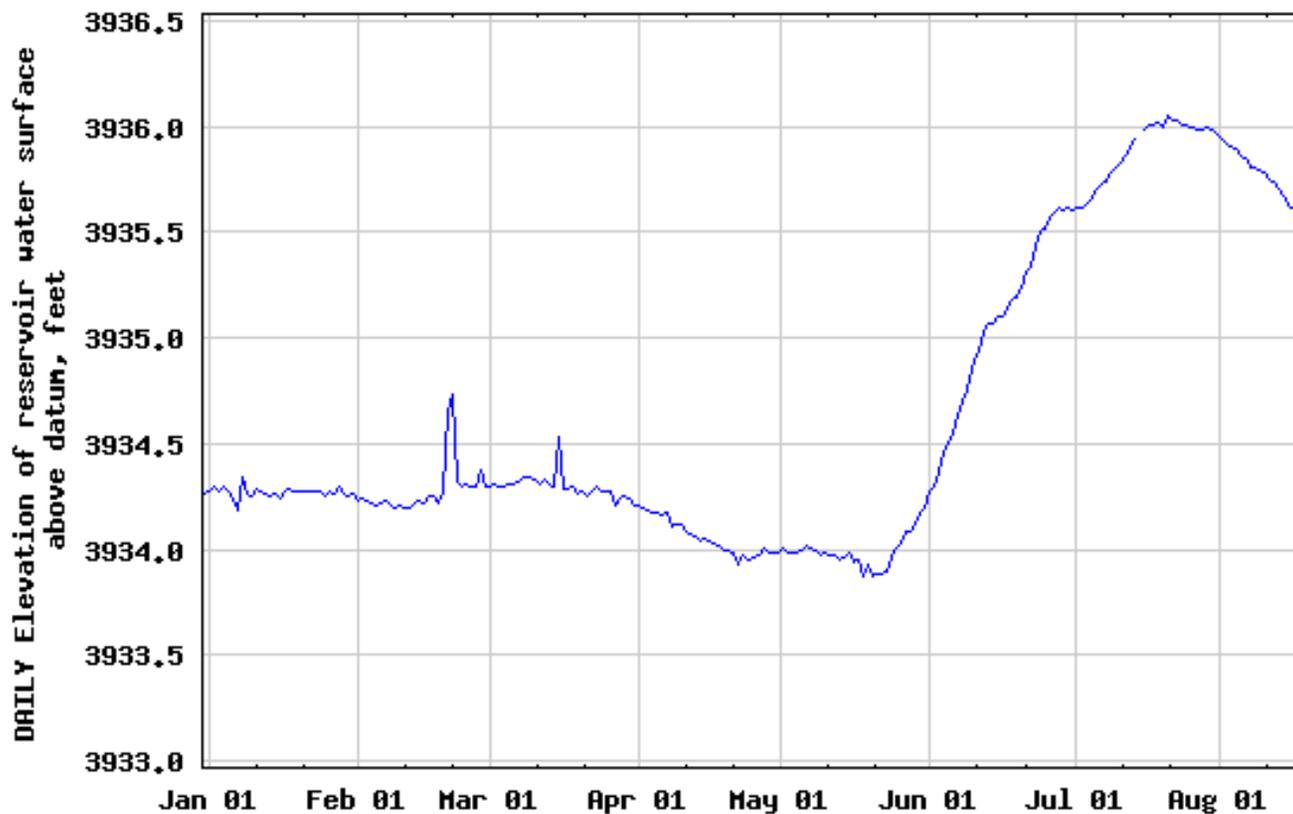
Virginia Ck near Bridgeport



# Real-Time Data on Walker Lake Gage



USGS 10288500 WALKER LAKE NEAR HAWTHORNE, NV

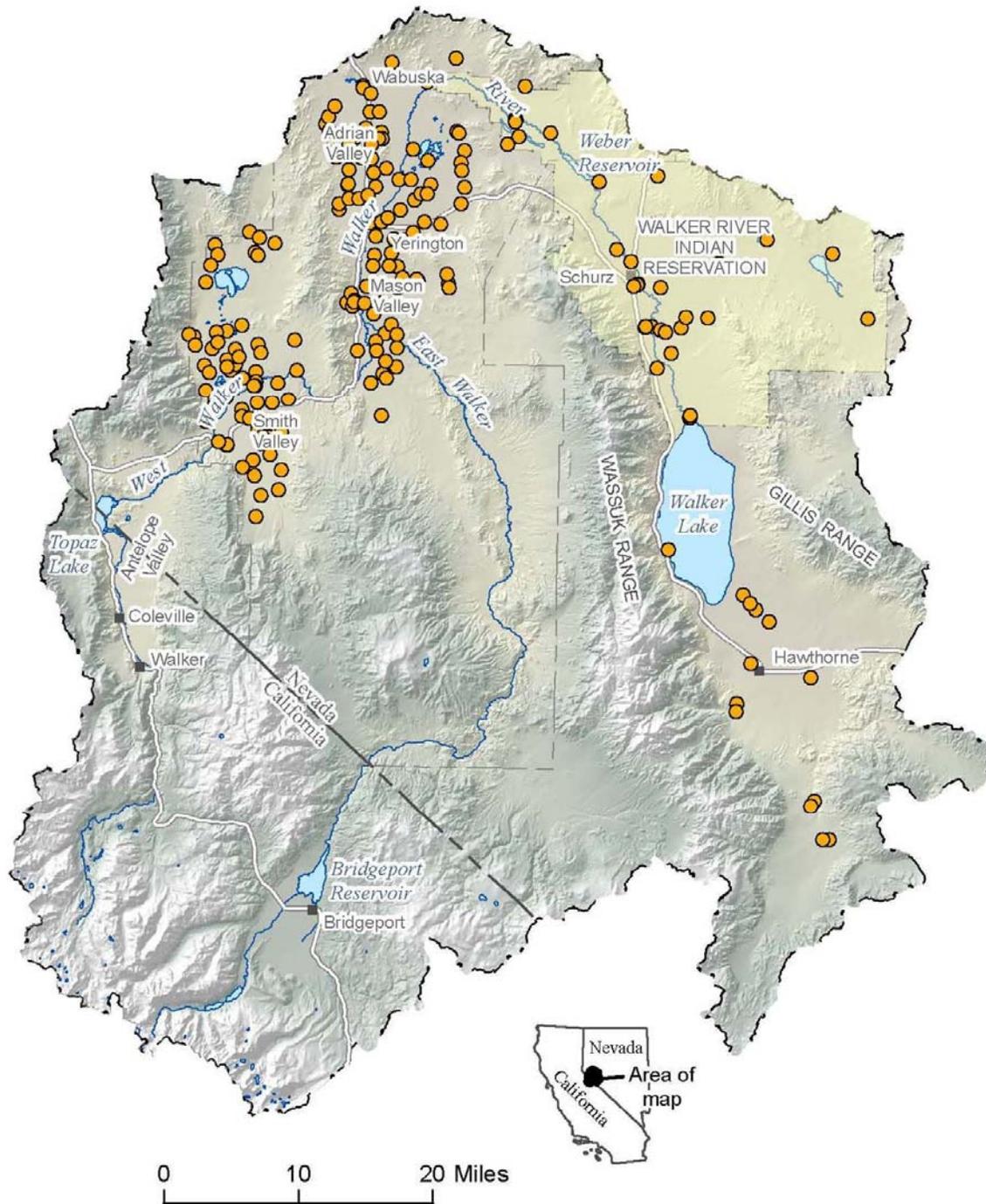


Provisional Data Subject to Revision



# GW Network

- GW sites

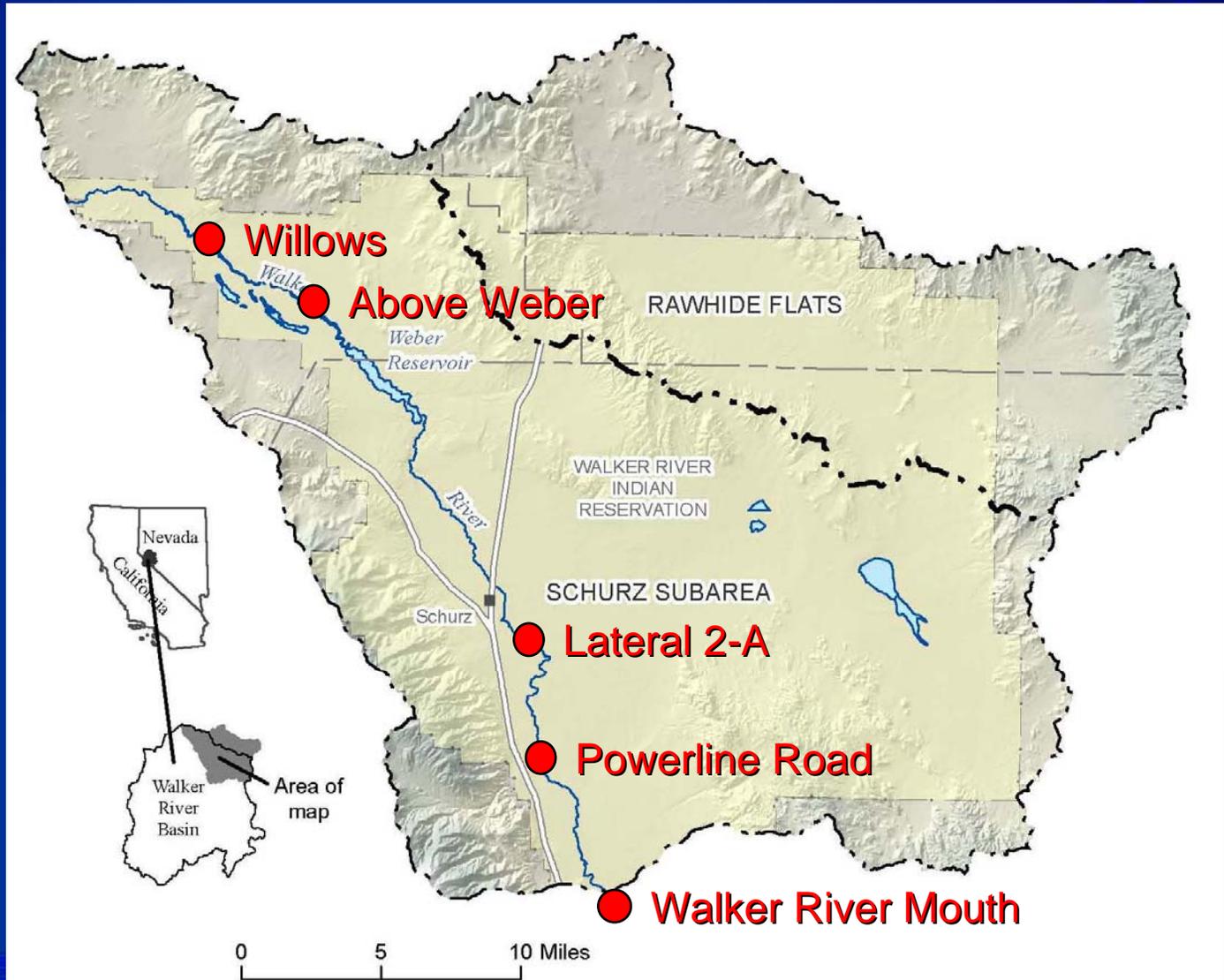


# Ground-Water/Surface-Water Sites

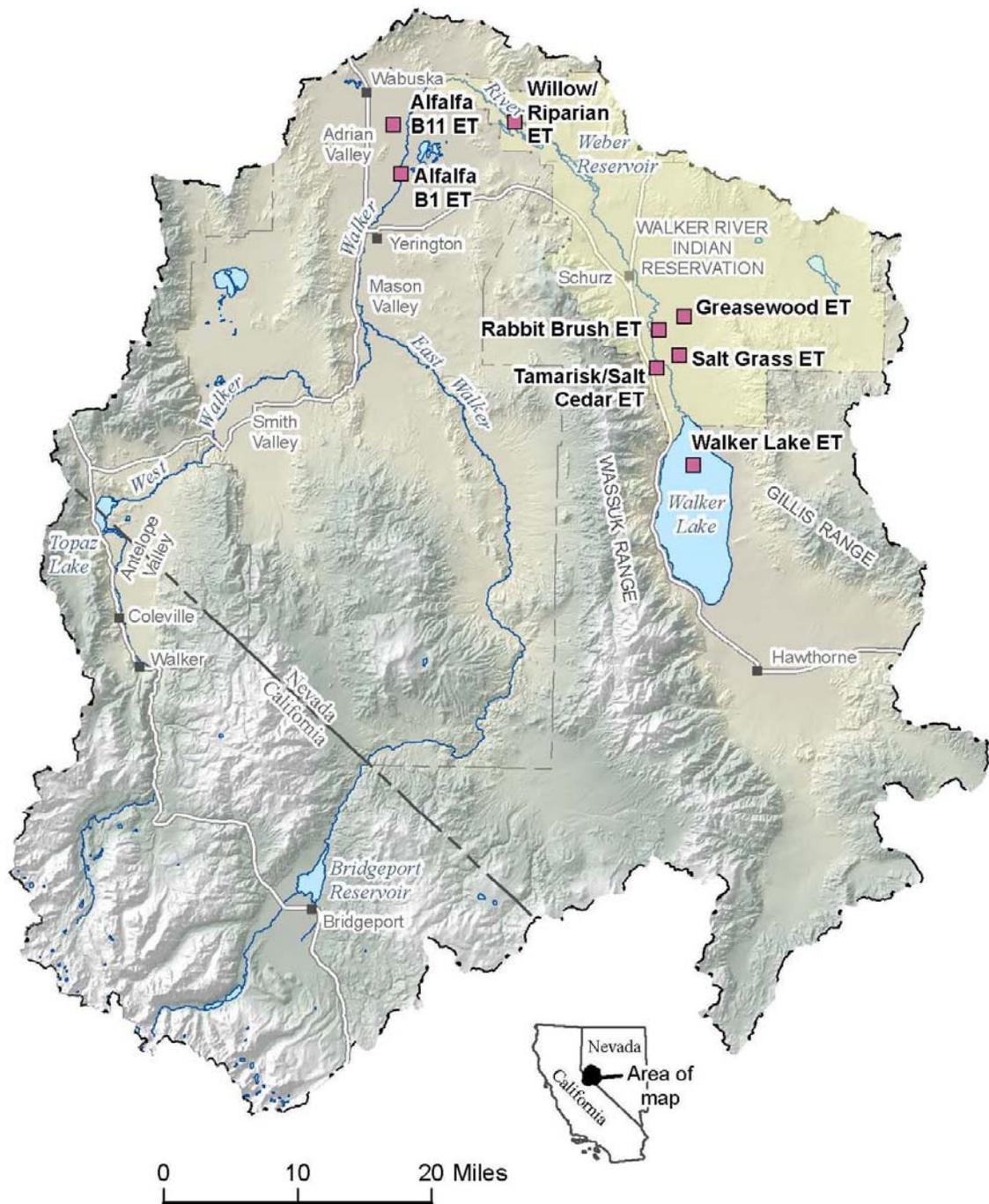
- Willows ET (above Weber)
- Cow Camp Gage
- Lateral 2-A Gage
- Powerline Road
- Walker River at Mouth



# GW/SW Site Locations

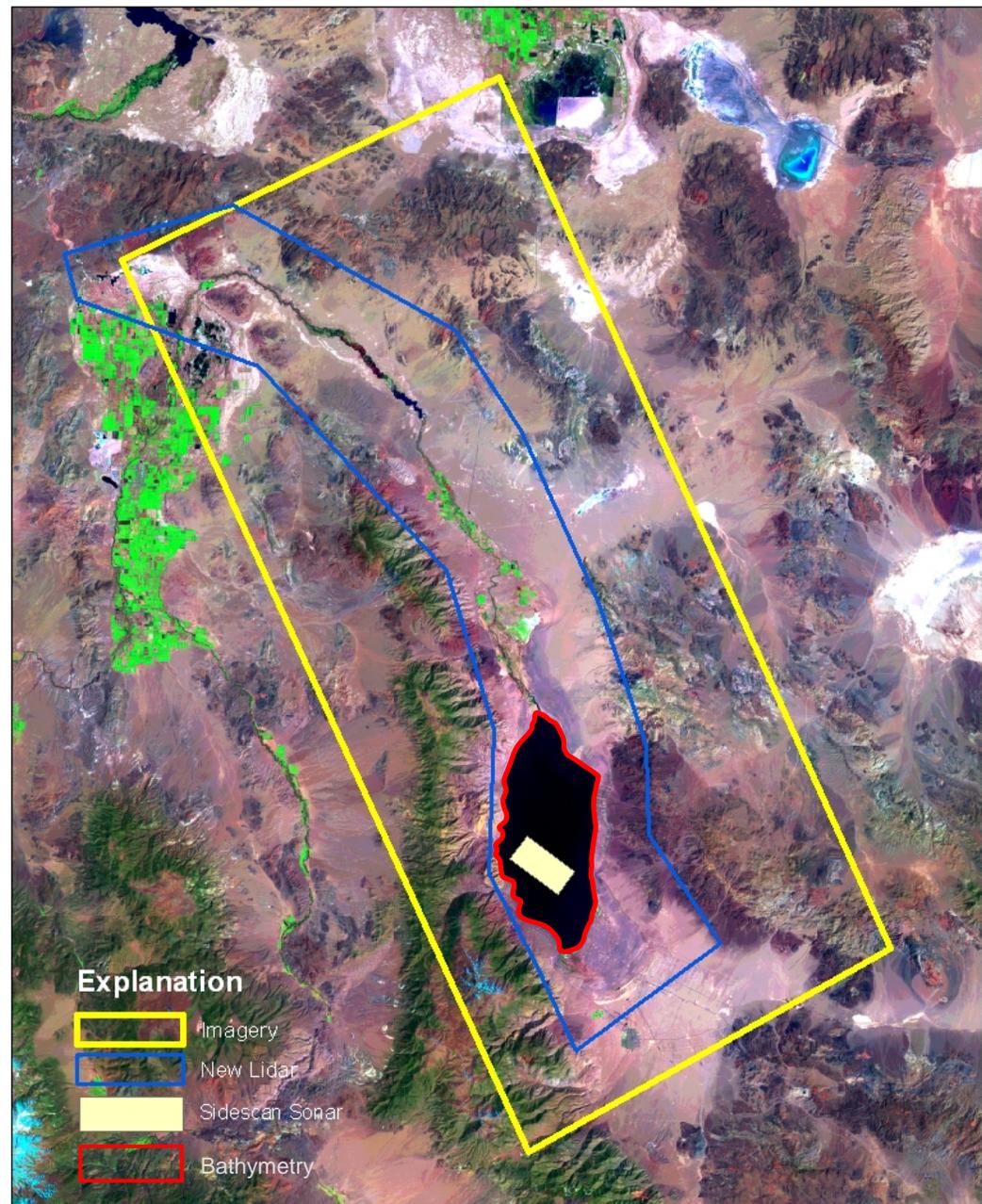


# ET Network



# Mapping:

- Satellite imagery
- New imagery
- Lidar
- Bathymetry
- Side-scan sonar



0 3 6 12 Kilometers

Walker Lake Project Area

# Walker Lake bathymetry

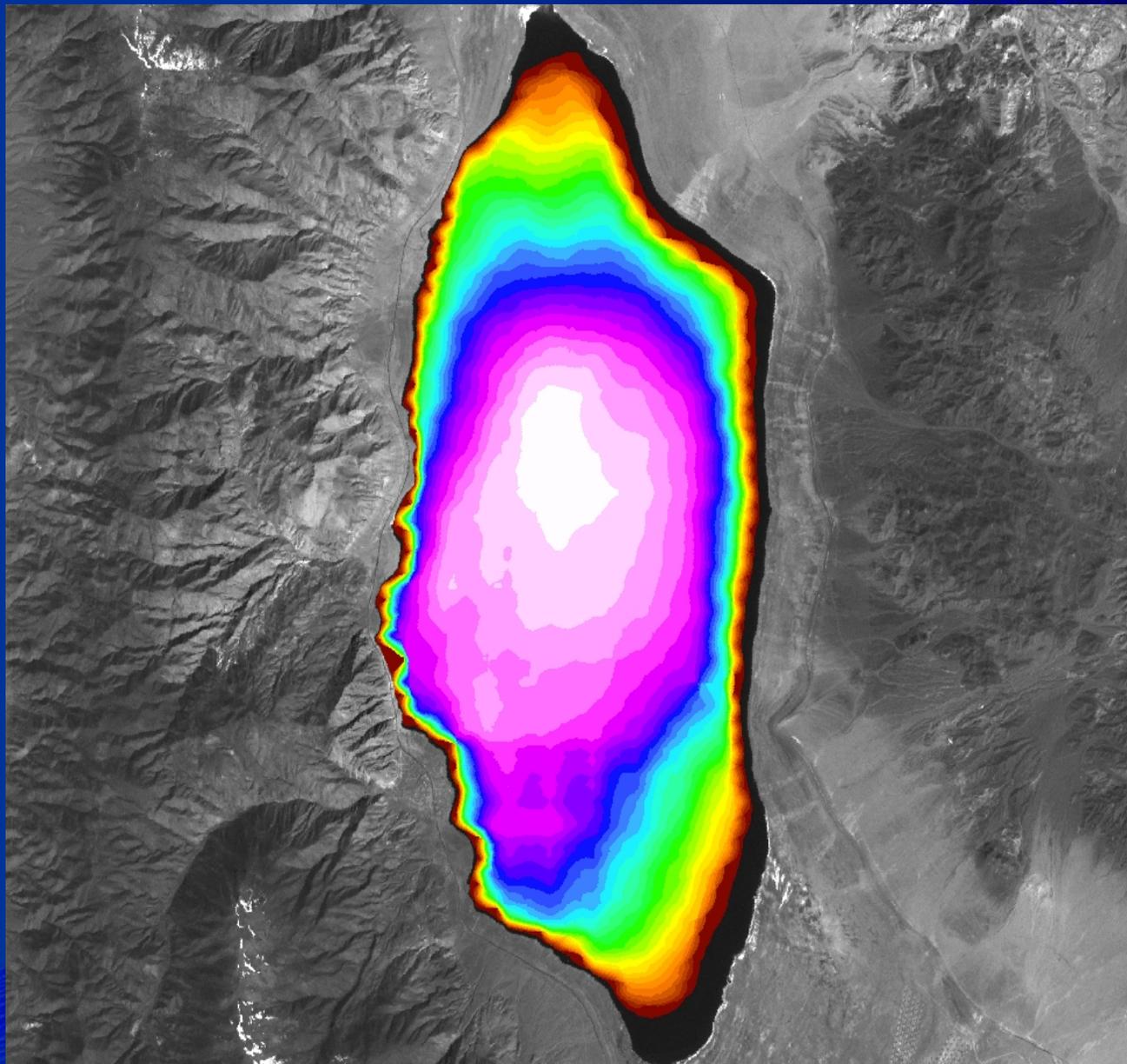
## Refined elevation/volume relations



# Bathymetry

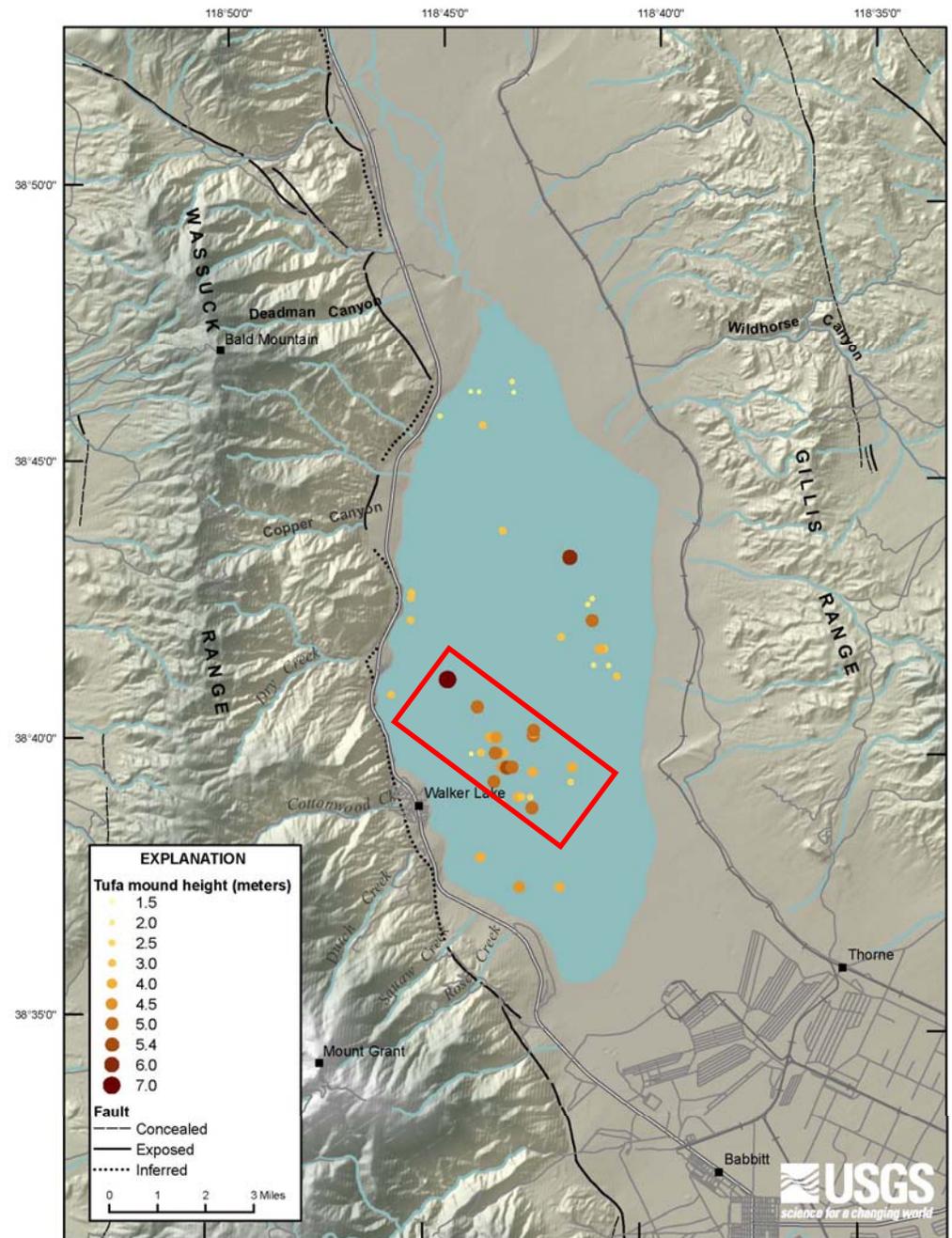
Maximum depth  
February 2005  
was 81.4 ft

Provisional, Subject to revision



# Tufa Mounds in Walker Lake?

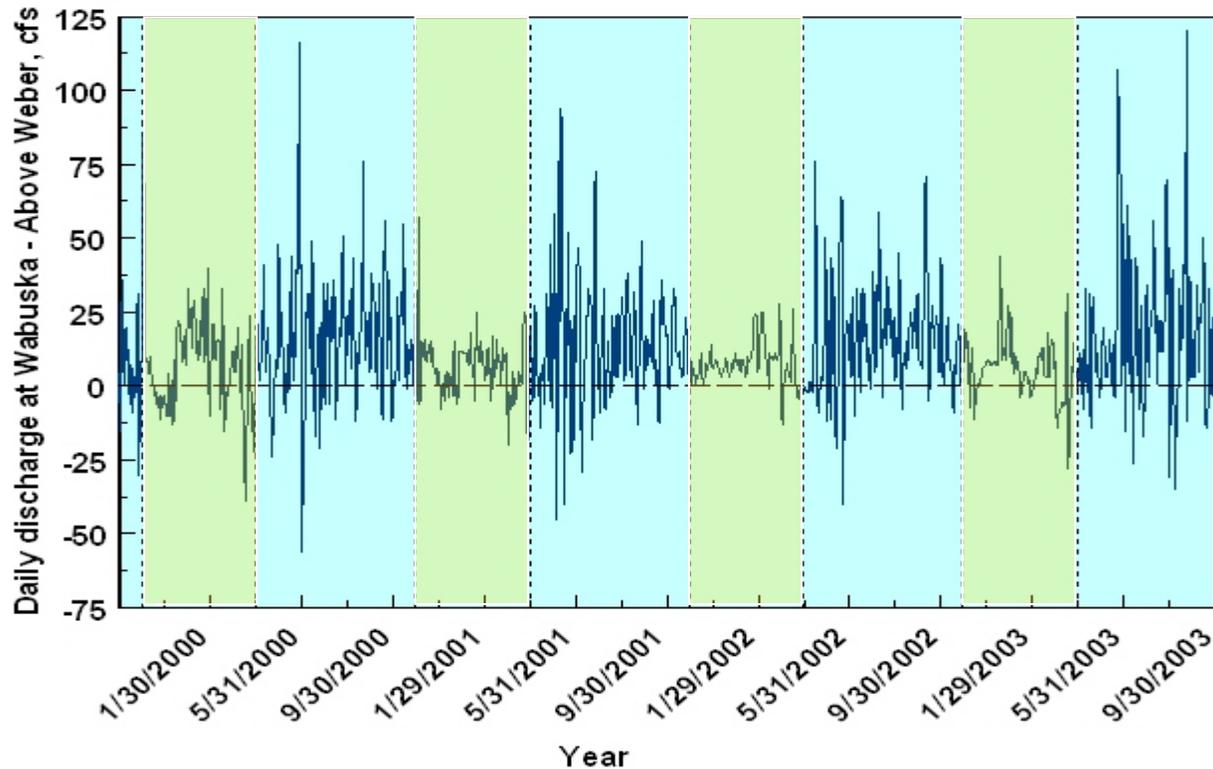
- Side-scan sonar



# Bottom of Walker Lake

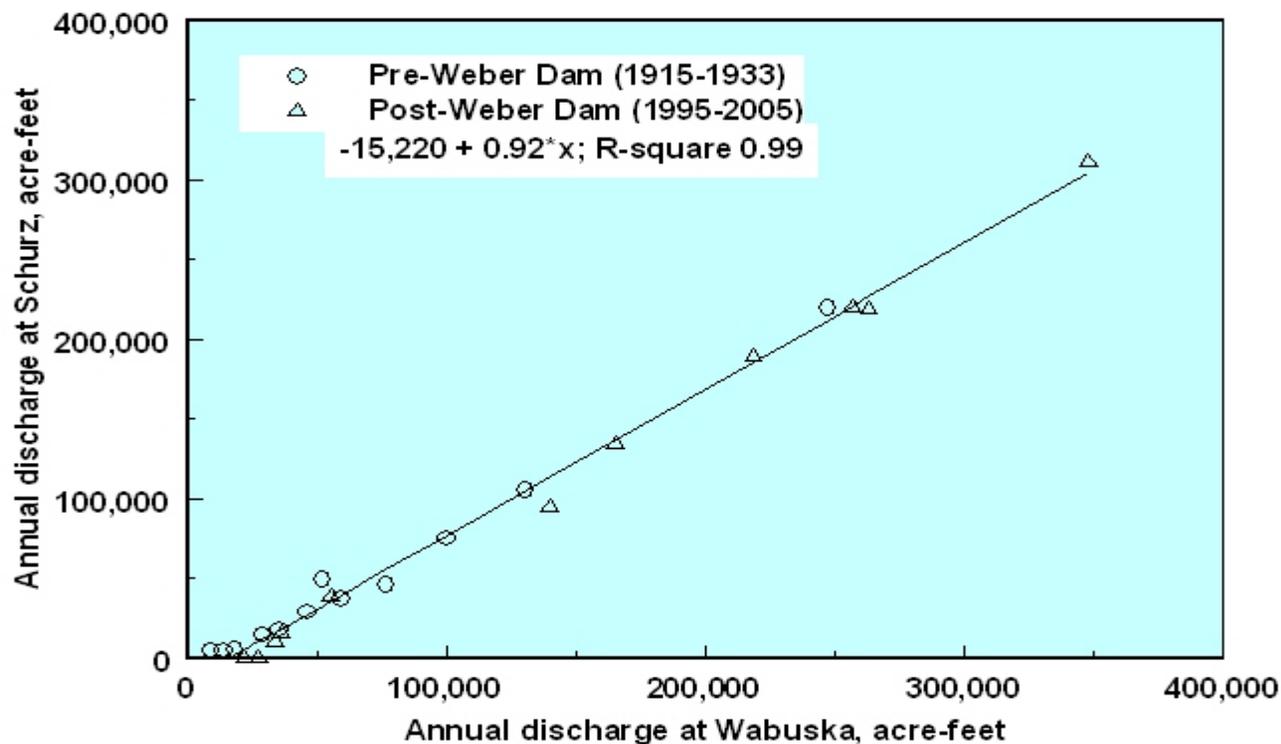


# Effect of ET on Streamflow



Preliminary Data-Subject to Revision

# Streamflow at Wabuska vs Schurz



Preliminary Data-Subject to Revision

# Web Site

Click on Data link for interactive map page



- Objectives
- Approach
- Maps
- Imagery
- Schedule
- Project Team
- Data**
- Publications
- Photo Gallery
- Mercury Studies
- Related Links

## Hydrology of the Walker River Basin

Walker Lake is one of the few perennial, natural terminal lakes in the Great Basin. Terminal lakes are sinks for surface-water drainage in topographically closed basins. Under natural conditions, evaporation from the lake surface typically is the primary component of basin outflow. Due to high evaporation rates in the Great Basin, the water-levels and salinity of terminal lakes are extremely sensitive to changes in streamflow. Most streamflow in the Walker River Basin originates as snowmelt from the Sierra Nevada. Prior to the late 1800s, most of the water flowed into Walker Lake. Since then, agricultural diversions have increased to the point that, except during flood flows, most streamflow is consumed by agriculture. Between 1882 and 1994, upstream diversions caused Walker Lake to decline about 140 feet and the total dissolved solids (TDS) concentrations to increase from 2,500 mg/L to 13,300 mg/L. Currently (2004), the TDS is about 15,000 mg/L. Compared to the Great Salt Lake, Walker Lake is relatively fresh and supports a diverse ecosystem including the threatened Lahontan cutthroat trout (LCT). The LCT has adapted to the high TDS of terminal basins. However, diversions have lowered lake levels and increased TDS to concentrations that threaten its survival.

The ecosystems and recreational uses of Walker Lake and other terminal lakes in the Great Basin have become at-risk due to consumptive water use. The goal of section 2057 of Public Law 107-171 is to provide water to selected at-risk terminal lakes in Nevada in order to sustain their ecosystems. This study will provide scientifically sound data and tools to parties involved in the Walker River Mediation so they can evaluate alternatives for supplementing flow to Walker Lake.

For further information about this study, contact:

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<http://nevada.usgs.gov/walker/>

**PROVISIONAL DATA SUBJECT TO REVISION**

Available data for this site

Real-time

GO

[Nevada Water Science Center Annual Data Report](#) This website is an online version of the latest in a series of annual reports that document hydrologic data gathered from the U.S. Geological Survey's surface-water and ground-water data-collection networks in Nevada.

[Station Data Availability Page](#) This page provides links to pages from the Annual Data Report which are specific to this site. These pages may include daily value tables, graphic summary pages and water quality data.

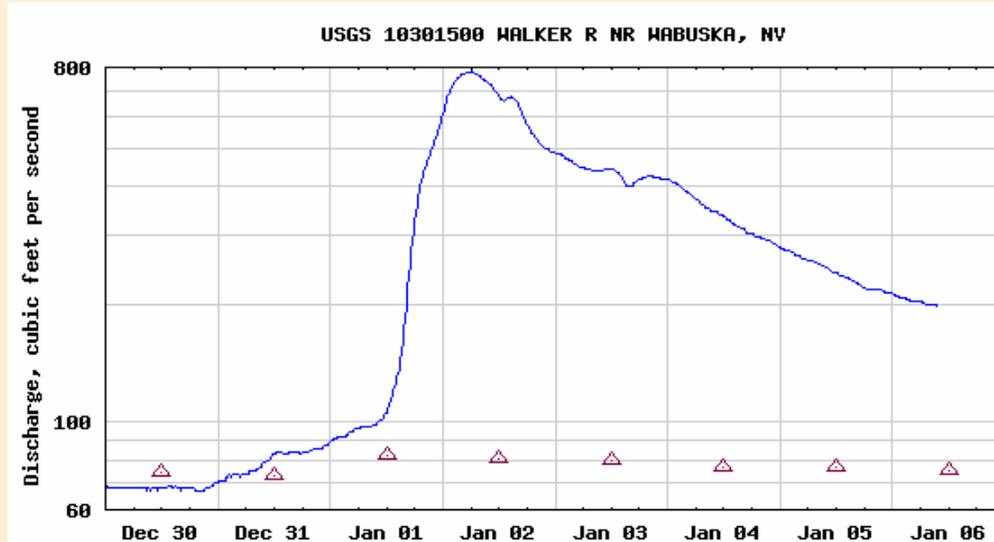
**During winter months, stage and discharge may be affected by ice in the channel.**

This station managed by the Carson City Field Unit.

<b>Available Parameters</b>	<b>Output format</b>	<b>Days</b>	get data
All 4 parameters available at this site 00060 Discharge (DD 01) 00065 Gage height (DD 02) 00010 Temperature, water (DD 04)	Graph	7 (1-31)	

**Discharge, cubic feet per second**

Most recent value: 197 01-06-2006 09:30



# Plans for This Year

- Continue to collect data – Data network is essentially in full operation
- Develop elevation/surface area/volume relations for Walker Lake
- Classify and map vegetation
- Geophysics near Double Springs, river mouth, and south end of lake
- Install additional observation wells to refine hydrologic understanding of GW system

